17th INTERNATIONAL BIOLOGY OLYMPIAD
JULY 9-16, 2006
Río Cuarto – República Argentina
第 17 屆 國際生物奧林匹亞

THEORETICAL TEST
理論題
PART A

學生代碼 Student code:	

GENERAL INSTRUCTIONS 一般指示

- Please check that you have the appropriate examination papers and answer sheet, as well as a calculator and a black pencil.
  檢查你的試卷並核對答案紙，以及是否有一台電算機和一支黑鉛筆。
- Use the answer sheet provided to record your answers.
  使用答案紙記錄你的答案
- Remember to write down your personal code number on top of the answer sheet.
  記得在答案紙上寫下你的個人碼號
- All the questions are multiple choice and there is **ONLY ONE** correct answer.
  全是選擇題，<u>只有一個正確答案</u>
- You must mark your answers in the answer sheet by filling in the corresponding box.
  必須在答案紙上相應空格中標明你的答案
- Use the pencil provided to complete the answer sheet.
  使用所提供的鉛筆在答案紙作答
- You have 2 hrs 30 min (150 minutes) to answer the questions.
  你有 2 小時 30 分(150 分鐘)回答問題
- The maximum score is approximately 82 points (1 point each question).
  滿分是大約 82 分(每題 1 分)。

PLEASE, REMEMBER: DON'T WRITE THE ANSWERS ON THE EXAMINATION SHEETS. THE ACADEMIC COMMITTEE WILL CONTROL <u>ONLY</u> THE ANSWER SHEET!

請記住：答案請勿寫在試卷上，學術委員會<u>只看</u>答案紙

GOOD LUCK IBO COMPETITORS!

祝好運！ IBO 選手們

17º INTERNATIONAL BIOLOGY OLYMPIAD

THEORETICAL TEST

PART A

CELULAR BIOLOGY 細胞生物學

1- Which of the following structures and processes can exist in both prokaryotic and eukaryotic cells? 下列哪些構造及作用，同時存在於原核及真核細胞中？

I. Nuclear envelope.	核膜
II. Ribosomes.	核糖體
III. Introns.	插入序列, 內插子
IV. ATP synthesis.	ATP 合成
V. Cell membrane.	細胞膜
VI. DNA polymerase.	DNA 聚合酶
VII. Cytoskeletal elements.	細胞骨骼
VIII. rRNA 18S.	18S 大小的 rRNA

Answers

A) I, II, III and VIII.

B) II, IV, VI and VIII.

C) I, III, V and VII.

D) II, IV, V and VI.

E) II, III, VI and VIII.

2- What structure in the bacterial cell has the most variety in enzyme activity?

下列細菌的構造中，何種具有最多種類的酵素活性？

A) Cell membrane. 細胞膜

B) Cell wall. 細胞壁

C) Vacuole 液泡

D) Capsule. 莢膜

E) Flagellum. 鞭毛

3- Which of the following functions are carried out in the rough endoplasmic reticulum?

粗糙內質網具有下列何種功能？

I. Addition of carbohydrates to protein. 將醣類接到蛋白質上

II. Synthesis of lisosomal protein. 合成溶體中的蛋白質

III. Addition of carbohydrates to lipids. 把醣類接到脂質上

IV. Synthesis of membrane proteins. 合成細胞膜上的蛋白質

V. Formation of glycerol. 製造甘油

Answers

A) I, II and V.

B) II, III and IV.

C) II, IV and V.

D) I, II and IV.

E) III, IV and V.

4- Which of the following fibers bind to the cytoplasmic site of cell-matrix adherens junctions (focal adhesion)?

下列何種纖維與“細胞基質結合點(cell-matrix adherens junctions)”中靠細胞質的一端接合？

A) Tubulin protein fibers. 微管蛋白纖維

B) Collagen fibers. 膠原纖維

C) Actin protein fibers. 肌動蛋白纖維

D) Elastic fibers. 彈性纖維

E) Reticular fibers. 網狀纖維

5- Nuclear pores DO NOT permit the passage of: 核孔無法進行下列何種運輸作用？

A) nucleotides inward and protein outward. 往內運輸核苷酸、往外運輸蛋白質

B) RNA inward and chromosome outward. 往內運輸 RNA、往外運輸染色體

C) proteins inward and RNA outward. 往內運輸蛋白質、往外運輸 RNA

D) potassium ions inward and protein outward. 往內運輸鉀離子、往外運輸蛋白質

E) nucleotides inward and RNA outward. 往內運輸 DNA、往外運輸 RNA

6- Which is the function of the nucleolus? 下列何者為核仁的功能 ？

A) Import of cytoplasmic proteins. 輸入細胞質中的蛋白質

B) Regulation of nuclear pores. 調節核孔

C) Site of ribosome subunit assembly. 核糖體次單位組裝的場所

D) Storage of inactive DNA. 貯存不活化的 DNA

E) Synthesis of nuclear protein. 合成核蛋白

7- The activity of lysosomes is regulated by: 溶體的活性由下列何者所調節？

A) cytoplasmic ions. 細胞質中的離子

B) lysosomal pH. 溶體的 pH 值

C) temperature. 溫度

D) calcium. 鈣

E) nuclear DNA. 核 DNA

8- Which of the following **ARE NOT** the integral membrane proteins?

下列何者不是穿膜蛋白？

A) Glucose carrier. 葡萄糖載體

B) Sodium ion channel. 鈉離子通道

C) Surface receptor. 表面受器

D) Urea carrier. 尿素載體

E) Sodium-potassium pump. 鈉鉀幫浦

9- How do polypeptides find their way from the site of synthesis on the cytoplasmic ribosome to the place of their destination in the peroxisome?

多肽類如何由其細胞質中的核糖體(合成處)，運送到過氧化體(微粒體, 終站)？

A) Without signals. 不需任何信號

B) By specific transport along the cytoskeleton. 沿著特定的細胞骨架而運輸

C) By specific carboxy-terminal targeting signals. 具有特定的羧基終端標的信號

D) By specific vesicular transport. 透過特定的囊泡來運輸

10- What is embedded in the thylakoid membrane of the chloroplast and protruding as knobs from the outer surface?

下列何者鑲嵌在葉綠體的囊狀膜上，且從外表看起來向外突出？

A) Enzymes that fix carbon dioxide. 固定二氧化碳的酵素

B) Molecules of chlorophyll a and chlorophyll b. 葉綠素 a 和葉綠素 b 分子

C) P_{700} or P_{680} molecules. P_{700} 或 P_{680} 分子

D) Proton channels that synthesize ATP. 合成 ATP 的質子通道

E) Water splitting complex. 水分解反應複合體

11- Where are most proteins of respiratory chain in the mitochondrial structure located?

執行呼吸作用電子傳遞鏈的蛋白質位於粒線體中的哪一個部位？

A) Dissolved within the fluid of the matrix. 溶在粒線體的基質中

B) In the cytoplasm on the outer surface of the mitochondria. 位於粒線體外膜外側的細胞質中

C) In the space between the two membranes. 位於兩層膜之間

D) On the surface and embedded within the outer membrane. 鑲嵌在外膜內或附著於其表面

E) On the surface and embedded within the inner membrane. 鑲嵌在內膜內或附著於其表面

12- Two sister chromatids fail to separate at the anaphase because microtubules became improperly attached to the kinetochores and the spindle checkpoint fails to arrest division. What is the most likely result?

分裂後期，一對姐妹染色分體因微管不恰當地接在著絲點上而不能分離，且紡錘體的檢查點未能停止細胞分裂的進行，則最可能的結果為下列何者？

A) Both chromatids will remain at the equator of the spindle. 兩染色分體留在紡錘體赤道板

B) The mitosis process will stop immediately. 有絲分裂過程會立刻停止

C) One daughter cell will lose all its chromosomes. 一子細胞會失去全部的染色體

D) One daughter cell will lose one chromosome. 一子細胞會失去其中一條染色體

13- Which of the following lipids contain glycerol in their structure?

下列何種脂類的構造中含有甘油？

A) Sphingolipids, Triacylglycerides, Cholestrol 神經鞘磷脂、三酸甘油酯、膽固醇

B) Phosphatidylcholine, Wax, β-Carotene 磷脂醯膽鹼(卵磷脂)、蠟、β-胡蘿蔔素

C) Triacylglycerides, Phosphatidylcholine, Phosphatidylethanolamine

三酸甘油脂、磷脂醯膽鹼(卵磷脂)、磷脂醯乙醇胺

D) Cholestrol, Phosphatidylcholine,Phosphatidylethanolamine

膽固醇、磷脂醯膽鹼(卵磷脂)、磷脂醯乙醇胺

E) Carotenoides, Sphingolipids, Phosphatidylcholine.

類胡蘿蔔素、神經鞘磷脂、磷脂醯膽鹼(卵磷脂)

14- Which of the following reactions are likely to occur in the cytoplasm of an eukariotic cell? 下列哪些反應發生於真核生物的細胞質中？

I. Krebs cycle.	克氏循環
II. Oxidative catabolism of fatty acids	脂肪酸氧化
III. Glycolysis	糖解作用
IV. Lactic fermentation	乳酸發酵
V. Etanol fermentation	酒精發酵
VI. Glyoxylate cycle	乙醛酸循環

Answers

A) I, IV, and VI.

B) III, IV and V.

C) II, I and III.

D) II, IV and V.

E) IV, V and I.

15- Which of the following statements corresponds to apoptosis (Programmed Cellular Death)? 下列有關細胞凋亡的敘述, 哪些正確？

I. Enzymes known as caspases are involved. 有酵素 Caspases 的參與

II. Cellular swelling and plasmatic membrane lysis are observed.
可觀察到細胞膨脹及細胞膜溶解

III. The nucleus degrades randomly into fragments. 細胞核隨機分解成碎片

IV. The product of the tumor-suppressing gene (p53 protein) activates in response to DNA damage. 因 DNA 的破壞，使得腫瘤抑制基因 p53 被活化

V. It is a process that involves consumption of ATP
是一種需耗用 ATP 的過程

Answers

A) I, IV and V.

B) II, III and IV.

C) I, II and V.

D) II, IV and V.

E) I, II and III.

16- Which of the following enzymes **DOES NOT** correspond to the Krebs cycle?

下列何者不屬於克氏循環中的酵素？

A) Isocitrate dehydrogenase 異檸檬酸脫氫酶

B) Succinate dehydrogenase 琥珀酸脫氫酶

C) Citrate synthase 異檸檬合成酶

D) Pyruvate carboxylase 丙酮酸羧化酶

E) α-ketoglutarate dehydrogenase α-酮戊二酸脫氧酶

PLANT ANATOMY AND PHYSIOLOGY

17- Which are the key terms to explain water transport in the xylem?

下列何者為木質部中水分運輸的關鍵因子?

A) Root hairs, cations concentration, transpiration. 根毛, 陽離子濃度, 蒸散作用

B) Transpiration, tension, guttation. 蒸散作用, 壓力, 泌液作用

C) Transpiration, water cohesion and root pressure. 蒸散作用, 水的內聚力, 根壓

D) Tension, cavitation, guttation. 壓力, 形成空腔, 泌液作用

E) Transpiration, cuticle, water potential. 蒸散作用, 角質層, 水勢

18- Which of the following statements about the mechanism of stomatal opening is true?

有關氣孔打開之機制的敘述, 下列何者正確?

A) The concentration of abscisic acid in the guard cells increases.

保衛細胞中的 ABA 濃度升高

B) Higher K^+ concentrations decrease guard cells' water potential.

由於保衛細胞中 K^+的濃度較高, 使得水勢降低

C) The Level of carbon dioxide in the spaces inside the leaf increases.

葉片細胞間隙中的 CO_2 量增加

D) Lower K^+ concentrations decrease guard cells' water potential.

由於保衛細胞中 K^+的濃度較低, 造成水勢降低

E) Potassium ions diffuse passively out of the guard cells.

K^+以主動擴散方式送出保衛細胞

19- An active sieve tube element is characterized by having:

下列何者為具有功能之篩管細胞的特徵?

A) secondary wall, nuclear desintegration, sieve plates. 次級細胞壁, 細胞核降解, 篩板

B) primary wall, central vacuole, a nucleus. 初級細胞壁, 中央大型液胞, 細胞核

C) secondary wall, large amounts of callose, sieve plates. 次級細胞壁, 大量的胼胝質, 篩板

D) primary wall, bordered pits, a nucleus. 具初級細胞壁, 緣孔, 細胞核

E) primary wall, sieve plates, desintegrated nucleus and tonoplast.

初級細胞壁, 篩板, 細胞核降解及小型液胞

20- Which of the following statements is not related to plants pollinated by wind (anemophily)?

下列敘述何者與風媒花植物無關?

A) They have large, divided or plumose stigma. 具有大型, 分叉或羽狀的柱頭

B) They produce a large quantity of pollen. 產生大量的花粉

C) They have not showy flowers. 沒有鮮豔的花

D) They have smooth and dry pollen. 花粉光滑而乾燥

E) They present flowers of diverse colors and agglutinated pollen.花色鮮豔, 花粉具黏性

21- The function of the aleurone layer in the caryopsis is associated with:

穎果中糊粉層的功能為何?

A) protection the embryo. 保護胚

B) production and release enzymes that degrade the starch and proteins of the endosperm.
產生並釋放酵素, 以分解胚乳中的澱粉及蛋白質

C) production of gibberellins. 產生吉貝素

D) synthesis of carbohydrate. 合成碳水化合物

E) accumulation of water. 聚集水分

22- The potato (*Solanum tuberosum*) tuber is characterized by: 馬鈴薯塊莖的特徵為何?

A) being a modified underground stem. 變態的地下莖

B) accumulating large quantity of starch. 聚積大量的澱粉

C) being a kind of asexual reproduction. 是一種無性生殖的方式

D) containing several buds. 具有許多芽眼

E) all of them are true. 以上皆是

23- An aggregate fruit is originated from: 聚合果源自下列何者?

A) a set of flowers clustered in a receptacle.

花托上有多朵花

B) a flower with several carpels and a syncarpous gynoecium.

一朵花, 其雌蕊由多個心皮癒合所形成

C) a flower with syncarpous gynoecium and axile placentation.

一朵花, 其雌蕊由多個心皮癒合所形成, 且為中軸胎座

D) a flower with several separated carpels.

一朵花, 具多個分離的心皮

E) several flowers around an axis.

中軸上有多朵花

24- In a laboratory, stems and roots of different plants were cut. When putting them into a box the slides mixed. Which of the following cross sections corresponds to a primary root of Magnoliopsida?

在實驗室中, 將不同植物的莖與根製成玻片, 但盒中的玻片被弄混了, 請問下列相關橫切片的描述, 何者符合雙子葉植物的初級根?

A)	Epidermis 表皮	Cortex 皮層	Bicollateral bundles 複並列維管束	Pith 髓
B)	Epidermis 表皮	Cortex 皮層	Pericycle 周鞘	4 xylem strands alternate with 4 phloem strands 四束木質部與四束韌皮部相互交錯排列
C)	Periderm 周皮	Secondary Phloem 次級韌皮部	Cambium 形成層	Secondary Xylem 次級木質部
D)	Epidermis 表皮	Cortex 皮層	Pericycle 周鞘	20 xylem strands alternate with phloem 20 束木質部與韌皮部相互交錯
E)	Epidermis 表皮	Sclerenchyma 厚壁組織	Scattered vascular bundles 散生維管束	Hollow pith 中空的髓

25- Which of the following combinations present only primary walls in an adult plant?

成熟植物中, 下列何組細胞只具有初級細胞壁?

A)	Vessels members 導管細胞	Meristematic cells 分生細胞	Parenchyma cells 薄壁細胞
B)	Colenchyma cells 厚角細胞	Fibres 纖維	Sieve tube element 篩管細胞
C)	Sclereids 厚壁細胞	Colenchyma cells 厚角細胞	Sieve cells 篩細胞
D)	Meristematic cells 分生細胞	Tracheary elements 木質部輸導細胞	Colenchyma cells 厚角細胞
E)	Sieve elements 篩管細胞	Meristematic cells 分生細胞	Colenchyma cells 厚角細胞

26- Identify the following characteristics in the floral diagrams below: Calyx and corolla with the same number of parts in each whorl, the number of stamens are twice the number of sepals and petals, gynoecium with 5 carpels.

根據下列花的模式圖, 判斷下列何者符合以下敘述: 在每一輪上, 花萼及花瓣的數目相同; 雄蕊數目是萼片花瓣的兩倍; 雌蕊由 5 個心皮組成

I

II

III

IV

A) I, II and IV.

B) II and III.

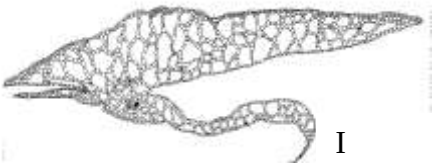
C) III and IV.

D) I, II and III.

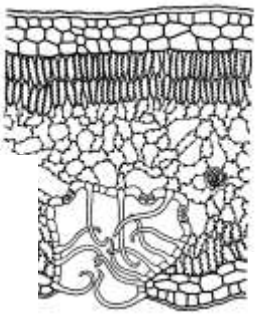
E) I and IV.

27- The following figures correspond to cross sections of leaves. Which one/s correspond/s to a hydrophytic habitat?

下列葉片的橫切面中, 何者(或哪些)適合生活在有水的環境?



I



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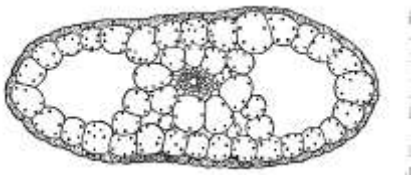

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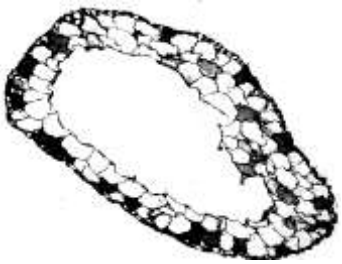
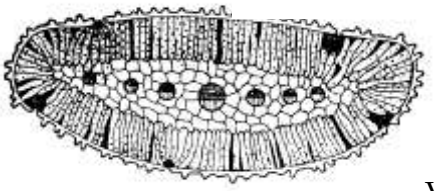


IV



V

A) I, II and III.

B) II.

C) I, III, IV and V.

D) I, II and V.

E) I, III and IV.

28- In a 5-m-tall young Eucalyptus, a person stuck 2 long nails horizontally and opposite to each other in its trunk, at a height of 1.0 m. Today the tree is 10 m tall. Are there changes in the height above the ground and the distance between the two nails?

有一棵 5 公尺高的尤加利樹，某人在離地 1 公尺高的樹幹上釘了兩根長釘子, 其在樹幹上的高度相等且彼此相對. 如今, 這棵樹長到 10 公尺高, 而這兩根釘子的高度及彼此間距離有何變化?

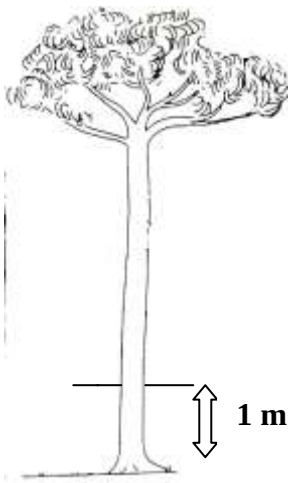
A) The height of the two nails above the ground increases due to the activity of vascular cambium. 由於維管束形成層的生長, 兩根釘子的高度增加

B) The height of the two nails above the ground remains unchanged because primary growth occurs in the stem tip. 兩根釘子的高度沒有改變, 因為初級生長發生在莖頂

C) The distance between the two nails will increase due to activity of vascular cambium. 由於維管束形成層的生長, 兩根釘子之間的距離增加

D) The height and distance between the two nails increase due to activity of the intercalary meristem. 由於中央分生組織的生長, 兩根釘子的高度及彼此間距離增加

E) Both B and C are true. B 和 C 皆正確



ANIMAL ANATOMY AND PHYSIOLOGY

**** Regulation of body temperature is fundamental in the organisms. The balance between production and loss of heat determines the body temperature. In vertebrates like reptiles, amphibians and fish the body temperature fluctuates within a considerable rank. In birds and mammals there exists a group of reflex responses that integrate to keep/maintain the body temperature within a narrow rank in spite of the fluctuations of the atmosphere.**

The following 4 questions are related to this introduction.

體溫的調節對生物十分重要，體溫取決於身體產熱及散熱間的平衡，在脊椎動物如爬蟲類、兩生類及魚類，體溫會在一定的範圍內波動，在鳥類及哺乳類則具有多種與體溫調節相關的反射機制，以在環境溫度變動的情況下維持體溫。

29- Body temperature in mammals is regulated by: 哺乳類的體溫由下列何者調控？

A) spinal cord. 脊髓

B) medulla oblongata. 延腦

C) hypothalamus. 下視丘

D) cerebellum. 小腦

30- A naked person inside a room at 21º C of temperature and 80% humidity will lose heat mainly because of: 赤裸者於溫度 21℃, 溼度 80%的房間，體溫流失主要原因為何？

A) an increment of the metabolism. 代謝的增加

B) urination. 排尿

C) breathing. 呼吸

D) radiation and conduction. 放射散熱及傳導散熱

E) sweat evaporation. 汗液的蒸發

~~31- In a dehydrated person, corporal water must be replaced by means of intravenous infusion of:~~

本題刪除

~~A) distilled water.~~

~~B) a 2 % sodium chloride solution.~~

~~C) a 5% glucose solution.~~

~~D) a mixture of 1% glucose and sodium chloride solutions.~~

32- Select the correct combination of the temperature regulating mechanisms activated by cold: 下列何組為寒冷所引發的體溫調節反應?

A) perspiration - cutaneous vessel constriction - increased breathing.

排汗 – 皮膚血管收縮 – 呼吸速率增加

B) cutaneous vessel constriction - piloerection - increased adrenalin secretion.

皮膚血管收縮 – 毛孔收縮 – 腎上腺素釋放量增加

C) cutaneous vessel expansion - increased breathing – shivering.

皮膚血管收縮 – 呼吸增加 – 顫抖

D) increased adrenalin secretion – perspiration - piloerection.

呼吸增加 – 排汗 – 毛孔收縮

In the 18th century the Italian clergyman Lazaro Spalanzani (1729-1799), developed a very ingenious experience with the frogs in his swimming pool. He dressed some males with **tight** trousers to prevent the spreading of the semen into the water. That summer, Spallanzani did not have any tadpoles in his swimming pool. He collected the semen drops from the shorts and noticed that when he added them to the ova deposited by the females during amplexus, the ova developed into tadpoles.

Spallanzani´s frogs

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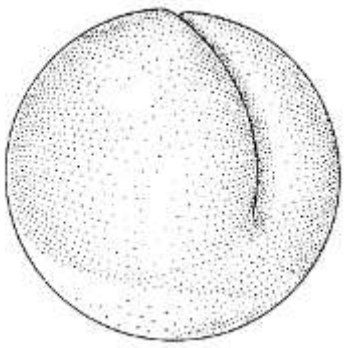


The clergyman concluded that the ovum requires contact with semen to be fertilized. Without knowing, he was the precursor of artificial fertilization. Spallanzani also observed that in the fertilized eggs there appeared a furrow that had also been observed by other researchers before. That furrow is the beginning of the frog developmental stages.

Eggs observed by Lázaro Spallanzani

Since then, developmental Biology has acquired significant advances, and at present the embryonic development of the amphibia is well known.

33- Which of the following statements about amphibia development are correct?

有關兩生類發育的敘述, 下列何者正確?

I. Amphibia have mesolecithal (medium yolk contents) eggs.兩生類為中黃卵

II. The blastomeres in the animal pole are smaller than in the vegetative / vegetal pole.

在囊胚中, 動物極比植物極小

III. Yolk is concentrated in the vegetative / vegetal pole. 卵黃集中於植物極

IV. Amphibians display holoblastic cleavage. 兩生類的卵裂屬於全裂型

Answers

A) I, II, and IV.

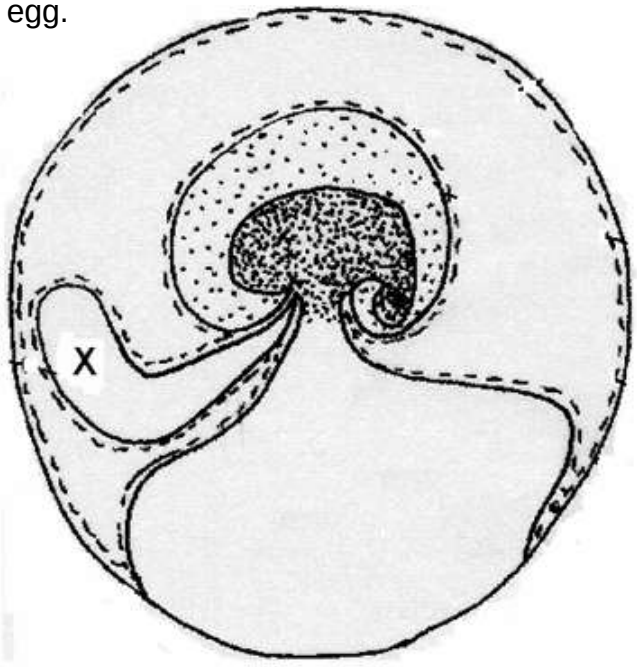
B) I and III.

C) II and IV

D) I, II, III and IV.

The amniotic egg is one of the major adaptations in the evolution of the vertebrates. The following scheme corresponds to an amniotic egg.

具有羊膜的卵是脊椎動物在演化過程中的一項重要適應, 右圖為具有羊膜的卵之示意圖



34 - The embryonic membrane marked with an X corresponds to:

圖中標示為"X"的膜狀構造為下列何者?

A) chorion. 絨毛膜

B) allantoids. 尿囊

C) amnion. 羊膜

D) yolk sac. 卵黃囊

35- One of the extra embryonic membranes produces proteins which suppress the immune response against the fetus. This membrane is:

在胚外膜中, 哪一層構造可產生蛋白質, 抑制母體的免疫反應, 以免對胚胎造成傷害?

A) the allantois. 尿囊

B) the chorion. 絨毛膜

C) the yolk sac. 卵黃囊

D) the amnion. 羊膜

36- If the corpus luteum of pregnancy is removed before the eleventh week of pregnancy:

若懷孕婦人的黃體於懷孕第十一週時被移除, 則下列敘述何者正確?

A) the pregnancy proceeds because there is no connection between the corpus luteum and pregnancy during this period of gestation.

懷孕將不受影響, 因此時的黃體構造與胚胎形成無關

B) the placenta has already secreted enough progesterone and estrogen to sustain the pregnancy. 胎盤已可釋放足量的助孕素及動情素, 以維持懷孕狀態

C) the embryo is spontaneously aborted. 會自發性地流產

D) none of the given answers is correct. 以上皆非

37- The three embryonic layers established during gastrulation in mammals subsequently differentiate into specific tissues and organs.

Select the correct pair: 有關各胚層與其將發育形成之器官的配對, 下列何者正確?

A) Mesoderm – liver. 中胚層 – 肝

B) Endoderm - dental enamel. 內胚層 – 牙齒

C) Ectoderm – crystalline lens. 外胚層 – 水晶體

D) Mesoderm - thyroid. 中胚層 – 甲狀腺

~~38- From which part of the paraxial mesoderm do the vertebrae develop?~~

~~A) Sclerotome.~~

~~B) Dermatome.~~

~~C) Myotome~~

~~D) Hypomere.~~

本題刪除

39- Select the correct sequence with relation to the embryonic origin of the spinal cord.

下列何者為脊椎發生過程的正確順序?

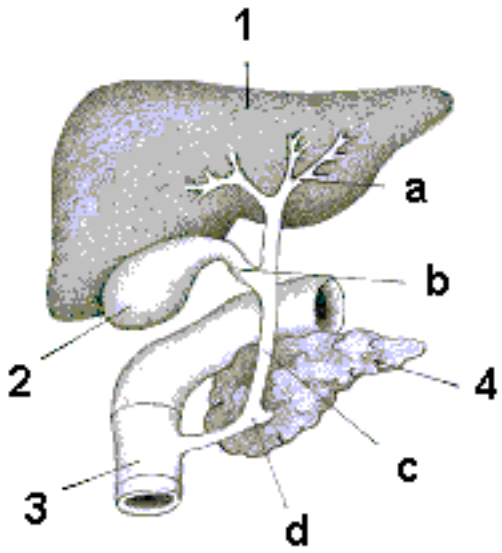
A) Neural tube – neural plate - neural fold - neural crest. 神經管–神經板 – 神經褶 – 神經嵴

B) Neural plate - neural crest - neural tube - neural fold. 神經板– 神經嵴 - 神經管– 神經褶

C) Neural crest - neural plate - neural fold – neural tube. 神經嵴–神經板 – 神經褶 - 神經管

D) Neural plate – neural fold - neural crest - neural tube. 神經板 – 神經褶 -神經嵴 - 神經管

The following 5 questions are related to the diagram: 據下圖回答 40-44 題



40- Upon which organs in the diagram does the cholecystokinin (CCK) act?

上圖中, 膽囊收縮素作用在哪些器官?

A) only 1; 2; 3 and 4.

B) only 2 and 3.

C) only 2 and 4.

D) only 3 and 4.

E) only 1; 3 and 4.

41- Which of following proteins are synthesized by the **organ marked with 1** in the diagram? 下列哪些蛋白質由器官 1 所製造?

I. Albumin. 白蛋白

II. Fibrinogen. 纖維蛋白原

III. Transferrin. 運鐵蛋白

IV. Angiotensinogen. 血管加壓素原

Answers

A) I, II and IV.

B) II, III and IV.

C) I and III.

D) II and IV.

E) All of them are correct. 以上皆是

42- The structure marked with **letter c** corresponds to the: 圖中構造 c 為下列何者?

A) Cystic duct. 輸尿管

B) Common hepatic duct. 肝管

C) Pancreatic duct. 胰管

D) common bile duct 總膽管

43- Which of following enzymes are secreted by **organ 4** in the above diagram?

圖中器官 4 可分泌下列哪些酵素?

I. Nucleases. 核酸酶

II. Lypase. 脂肪酶

III. Pepsin. 胃蛋白酶

IV. Trypsinogen. 胰蛋白酶原

V. Lactase. 乳糖酶

VI. Chymotrypsinogen. 胰凝乳蛋白酶原

Answers

A) only I, III and VI.

B) only I, II, IV and VI.

C) only II, IV and VI.

D) only I, III, IV and VI.

44- **Organ 4** of the above diagram also has an endocrinous function. One of the main hormones it releases is insulin. Which one of the following triplets is true regarding the effects of Insulin on fat tissue (adipose tissue), muscle and liver?

有關胰島素對脂肪組織, 肌肉及肝臟作用的敘述, 下列何者正確?

	Fat tissue 脂肪組織	**Muscle** 肌肉	**Liver** 肝臟
A)	Increase in glucose entry. 增加葡萄糖的進入	Decrease in glucose entry 降低葡萄糖的進入	Decrease in lipid synthesis 降低脂肪合成
B)	Increase in glucose entry 增加葡萄糖的進入	Increase in glycogen synthesis 增加肝糖的合成	Decrease in ketogenesis 降低酮體的產生
C)	Increase in fat acids synthesis 增加脂肪酸的合成	Decrease in glycogen synthesis 降低肝糖的合成	Increase in ketogenesis 增加酮體的產生
D)	Decrease in fat acids synthesis 降低脂肪酸的合成	Decrease in amino acid acquisition 降低胺基酸的攝取	Decrease in protein synthesis 降低蛋白質合成

GENETICS 遺傳學

**** The armadillo is a placental mammal of the order Xenarthra, family Dasypodidae, mostly known for having a bony armour shell made up of small, overlapping scales. All species are native to the American continent, where they inhabit a variety of environments.**

****犰狳是一種 Xenarthra 目，Dasypodidae 屬的胎盤類哺乳動物，其主要特徵為具有許多小而重疊的鱗片組成之盔甲。其全部種類原生於美洲大陸，可居住在多種環境中。**

45- This remarkable animal is the only known species that always produces monozygotic multiple offspring. After 140 days of gestation a female “armadillo” gives birth to 4 naked babies with soft armour. We expect that:

這是已知物種中，唯一由單一受精卵產生許多子代的物種。一隻雌犰狳在懷孕 140 天後，可生產 4 隻全裸、只具有柔軟盔甲的小犰狳。請問下列何者敘述正確？

A) the genotype of the four babies is the same as their mother´s.

4 個小犰狳的基因型均與他們的母親相同

B) all of these “armadillo” babies have the same genotype. 所有小犰狳都有相同的基因型

C) the babies are of different sexes. 小犰狳具有不同的性別

D) the four babies are haploid. 4 個小犰狳都是單倍體

E) the four babies have different phenotypes. 4 個小犰狳有不同的外表型

46- In an electrophoretic study of enzyme variation in one species of *Dasypus* you find 31 individuals A_1A_1, 24 A_1A_2 and 5 A_2A_2, in a sample of 60. Which are the frequencies of alleles A_1 and A_2?

以電泳分析某種 *Dasypus* 屬生物的酵素變化可得，在 60 個樣本內發現了 31 個 A_1A_1 個體，24 個 A_1A_2 和 5 個 A_2A_2。下列何者為此族群中對偶基因 A_1 和 A_2 的基因頻率？

A) $p(A_1)= 0.72$; $q(A_2) = 0.28$.

B) $p(A_1)= 0.52$; $q(A_2) = 0.48$.

C) $p(A_1)= 0.92$; $q(A_2) = 0.028$.

D) $p(A_1)= 0.28$; $q(A_2) = 0.72$.

E) $p(A_1)= 0.48$; $q(A_2) = 0.52$.

47- Is the above population in Hardy-Weinberg equilibrium? 上述族群是否符合哈溫平衡？

Table: χ^2-Distribution 卡方分配表

df	0.995	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	0.005
1	---	---	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.91	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.15	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278

A) Yes. 是

B) No. 否

C) It is not possible to determine. 無法決定

48- If in another population the frequency of the A_1A_1 genotype is 0.25 and the frequency of the A_1A_2 genotype is 0.45, in Hardy-Weinberg equilibrium, the frequency of matings between the A_2A_2 and A_2A_2 genotypes would be:

如果在另一族群中，基因型 A_1A_1 的頻率是 0.25，A_1A_2 頻率為 0.45，依哈溫平衡定律，將基因型 A_2A_2 和 A_2A_2 的個體進行交配的頻率為何？

A) 0.063.

B) 0.300.

C) 0.090.

D) 0.112.

E) 0.075.

49- Among the offspring of crosses between two given genotypes, a phenotypic ratio of 9:3:3:1 is discovered. This is a result of:

在某次兩個基因型的子代交配後，結果得到 9：3：3：1 的外表型比率。此結果是下列何者造成的？

A) epistasis. 上位基因遺傳

B) linkage. 聯會

C) independent assortment. 獨立分配

D) pleiotropy. 基因多效性

E) polyploidy. 多倍體

50- Two male specimens of the rodent *Akodon molinae* belonging to the same population were analyzed cytogenetically: One of them had 43 and the other 42 chromosomes. The Fundamental Number (number of chromosome arms in a somatic cell) was 44 in both of them. This may be due to:

某種嚙齒動物(*Akodon molinae*)體細胞的染色體應有 44 條。在某族群中，取兩隻表型正常的雄性個體作染色體分析，發現其中一隻有 43 條染色體，另一隻有 42 條。其可能原因為何？

A) chromosome loss. 染色體缺失

B) an inversion. 倒位

C) Robertsonian translocation. Robertsonian 易位

D) presence of B chromosomes. 具有 B 染色體

E) polyploidy. 多倍體

51- Which of the following statements is **NOT** true with respect to an X-linked recessive inheritance? 有關 X 染色體隱性遺傳的敘述，下列何者**錯誤**？

A) It affects mainly males. 主要影響男性個體

B) There is no male-to-male transmission in the pedigree. 不會由男性遺傳給男性子代

C) Females may be affected if the father is affected and the mother is a carrier.
如果父親為患者，母親為攜帶者，則其女兒可能患病

D) It affects either sex, but females are more affected than males.
它影響兩性中的任一性別，但女性比男性更容易患病

E) Affected males are usually born to phenotypically unaffected parents.
患病的男性通常生自表現型正常的父母

52- In chickens there exists a genetic condition called “creeper” (very short crooked legs). A cross of affected chickens, produced a progeny of 775 creepers and 388 normal chicks. The closest phenotypic ratio is:

雞群中有種「爬行雞」的遺傳性狀(具短而彎曲的腿)。若在交配後，產生 775 隻爬行雞和 388 隻正常雞的子代。其外表型比例最接近下列何者？

A) 3 : 1.

B) 2 : 1.

C) 1 : 1.

D) 3 : 2.

E) 4 : 1.

53- What is the mode of inheritance of the creeper trait in the above question?

承上題，下列何者可能是「爬行雞」性狀的遺傳模式？

A) Sex-limited. 性聯遺傳

B) Autosomal recessive-lethal. 體染色體的隱性致命遺傳

C) Epistatic to the normal allele. 上位基因對正常對偶基因的遺傳

D) Both a and b. a 及 b 均正確

E) X-linked recessive. X 染色體隱性遺傳

54- You carry out a cross between homozygous purple-eyed flies with vestigial wings, and wild-type flies. The resulting F_1 flies are all phenotypically wild-type. In the progeny of the testcross of F_1 females you observe the following phenotypes:

將紫眼殘翅同型合子的果蠅及野生型果蠅間進行交配，結果 F_1 子代外表型全為野生型。取 F_1 雌性果蠅進行試交，可觀察到以下外表型：

Phenotype 外表型	**Progeny 子代**
Purple-eyed, vestigial wings 紫眼、痕跡翅	1193
Purple-eyed, normal wings 紫眼、正常翅	159
Red-eyed, vestigial wings 紅眼、痕跡翅	161
Red-eyed, normal wings 紅眼、正常翅	1129

What is the map distance between these two loci? 請問此兩個基因間的距離為何？

A) 12.1 map units. 12.1 個遺傳單位

B) 48.2 map units. 48.2 個遺傳單位

C) 6.2 map units. 6.2 個遺傳單位

D) 24.4 map units. 24.4 個遺傳單位

E) none of the above. 以上皆非

55- In order to study a viral polymerase, a scientist decided to express the encoding gene in *Escherichia coli* using the recombinant DNA technology. Choose the correct option about steps mentioned below, in the right order.

為了研究病毒的聚合酶，科學家決定以基因重組技術表現位於大腸桿菌中的基因。請依照下列步驟，排出正確的操作順序

a. cloning into an expression vector 將基因轉殖至表現載體上

b. disruption of cells and isolation of cytoplasmic fraction. 打破細胞並分離細胞質中的成分

c. induction of protein expression. 誘導蛋白質表現

d. isolation of viral genomic RNA from purified virions. 由純化的病毒顆粒中分離病毒 RNA

e. PCR (polymerase chain reaction). PCR (聚合酶連鎖反應)

f. reverse transcription. 反轉錄

g. selection of the desired clone. 選擇所要的菌株

h. transformation into *Escherichia coli* cells. 將基因轉型到大腸桿菌的細胞中

Answer 答案

A) d, f, e, a, h, g, c, b.

B) d, b, c, a, h, e, f, g.

C) h, g, a, b, d, f, c, e.

D) d, f, e, h, g, b, c, a.

56- Which of the four options (A, B, C or D) shows the characteristics of the DNA molecule under physiological conditions? 下列何者顯示 DNA 在生理狀態下的特性?

	Base pairs (bp) per turn 每個螺旋的鹼基對數	**Diameter** 直徑	**Distance between two successive base pairs** 兩個鄰近鹼基對間的距離	**Form** 型式
A)	12 bp	2 nm	34 nm	A
B)	10 bp	1 nm	0.34 nm	B
C)	10 bp	2 nm	0.34 nm	B
D)	11 bp	1 nm	3.4 nm	A

57- A DNA molecule has 160 base pairs and 20 percent of adenine nucleotides. How many cytosine nucleotides are present in this molecule?

某條 DNA 分子中有 160 鹼基對，其中 20%是腺嘌呤，則此分子中有多少胞嘧啶?

A) 96 cytosine nucleotides(胞嘧啶).

B) 60 cytosine nucleotides.

C) 160 cytosine nucleotides.

D) 40 cytosine nucleotides.

E) 48 cytosine nucleotides.

58- *In vivo* amplification of genomic DNA requires some of the following:

自活體選殖基因組 DNA 需要下列哪些材料?

I. DNA polymerase. DNA　聚合酶

II. restriction endonucleases.　限制酶

III. a probe.　探針

IV. DNA ligase.　DNA 連接酶

V. a host.　宿主

VI. donor DNA.　外來 DNA

VII. methylases.　甲基酶

VIII. proteases.　蛋白酶

IX. a vector.　載體

X. Taq DNA polymerase.　Taq DNA 聚合酶

Answer

A) I, III, IV, V and VI.

B) II, IV, V, VI and IX.

C) II, V, VI, VII and IX.

D) IV, V, VI, IX and X.

ECOLOGY 生態

59- The following graph represents the hypothetical results of an experiment designed to recognize which nutrients can act as limitants of productivity in a salinized water lake. According to the areas of limitation, determine the lines in the graphic which correspond to each of these nutrients: phosphorus, nitrogen, iron and copper.

下圖為一個假想實驗, 探討在鹼性湖泊中, 環境生產力與營養鹽(限制因子)的關係, 請根據下圖, 判斷圖中各線條所代表的營養鹽分別為何(磷、氮、鐵或銅)?.

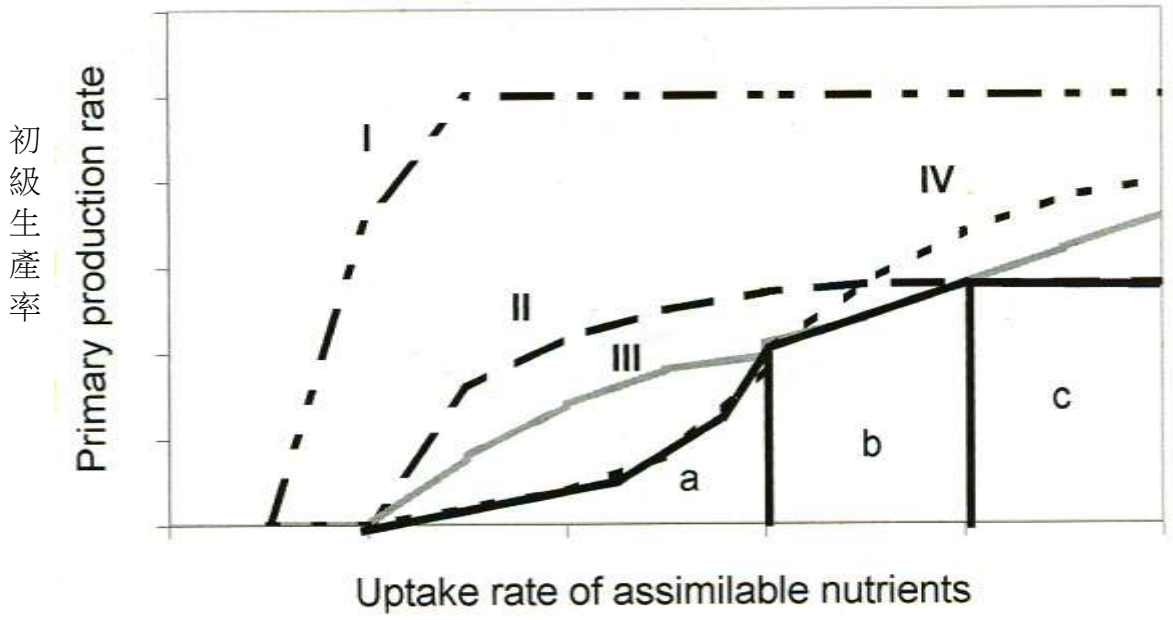
References 備註

Solid black line: primary production. 黑實線:初級生產力

a) Iron(鐵) limitation area. **鐵為限制因子的區域**

b) Nitrogen(氮) limitation area. **氮為限制因子的區域**

c) Phosphorus(磷) limitation area. 磷**為限制因子的區域**



A) I = iron 鐵, II = nitrogen 氮, III = phosphorus 磷, IV = copper 銅.

B) I = copper 銅, II = phosphorus 磷, II = nitrogen 氮, IV = iron 鐵.

C) I = nitrogen 氮, II = phosphorus 磷, III = iron 鐵, IV = copper 銅.

D) I = copper 銅, II = nitrogen 氮, III = iron 鐵, IV = phosphorus 磷.

E) I = iron 鐵, II = copper 銅, III = phosphorus 磷 IV = nitrogen 氮.

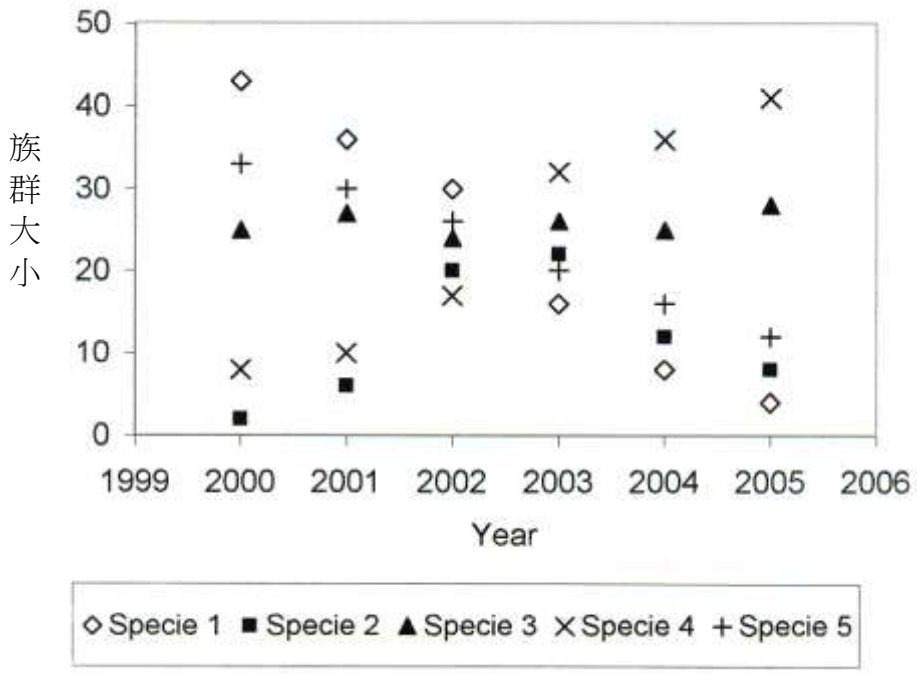
**** During a period of six years, the variation in abundance for five animal species was registered in the month of October in order to verify the recovery of the fauna of a contaminated lake after a decontamination process initiated in 1999. The abundance values are shown in the following figure.**

下圖表示在六年的研究期內, 每年十月紀錄五種動物數量的變異, 以監測受污染的湖水經過淨化的處理 (始於 1999 年) 後, 其內動物相恢復的情形.

The following 4 questions are related to the figure.

請根據下圖回答以下四題.

60- Abundance of species 3 tends to: 物種 3 的數量變化呈現下列何種情形.



A) diminish with time. 隨時間而減少

B) rise with time. 隨時間而增加

C) remain constant with time. 保持相對穩定

D) fluctuate at random with time. 隨時間表現不規律波動

E) fluctuate systematically. 隨時間表現規律性波動

61- The highest population size of species 2 was registered in the years:

在下列哪些年, 物種 2 的族群大小最大?

A) 2000 and 2001.

B) 2002 and 2003.

C) 2003 and 2004.

D) 2004 and 2005.

E) None of the above answers is correct because there is not complete information.

以上皆非, 因所提供的資訊不足以判斷

62- The species that allowed evaluating the reduction of contamination were:

下列哪些物種可用來顯示湖水淨化的成效?

A) 1; 2; and 3.

B) 2; 3; and 5.

C) 3; 4; and 5.

D) 1; 4; and 5.

E) 2; 4; and 5.

63- The reduction of contamination allowed the species richness:

湖水淨化使物種豐富度產生下列何種變化?

A) to rise with time. 隨時間增加

B) to diminish with time. 隨時間減少

C) not to change with time 不隨時間改變.

D) to fluctuate at random with time. 隨時間呈現不規律波動

E) to fluctuate systematically with time. 隨時間呈現規律性波動

64- In the same way as a population, a community shows several properties. Which of the following characteristics correspond to the community level?

群聚如同族群般也會呈現某些特性, 以下何者屬於群聚的特性?

A) Species diversity, stratification, relative abundance of females, and trophic webs.

物種歧異度、層次分布、雌性個體的相對數量、食物網

B) Species diversity, age distribution, deaths of individuals, and trophic webs.

物種歧異度、年齡分布、死亡個體數、食物網

C) Cohorts diversity, dominance, age distribution, and trophic webs.

年齡層的變異性、優勢性、年齡分布、食物網

D) Species diversity, dominance, relative abundance, and trophic webs.

物種歧異度、優勢性、相對數量、食物網

E) Species diversity, density, deaths of individuals, and age structure.

物種歧異度、密度、死亡個體、年齡結構

**** In the following figure five examples of interactions are shown.**

下圖表示五種交互作用

References 參考資料

R: limiting resources. 限制性的資源

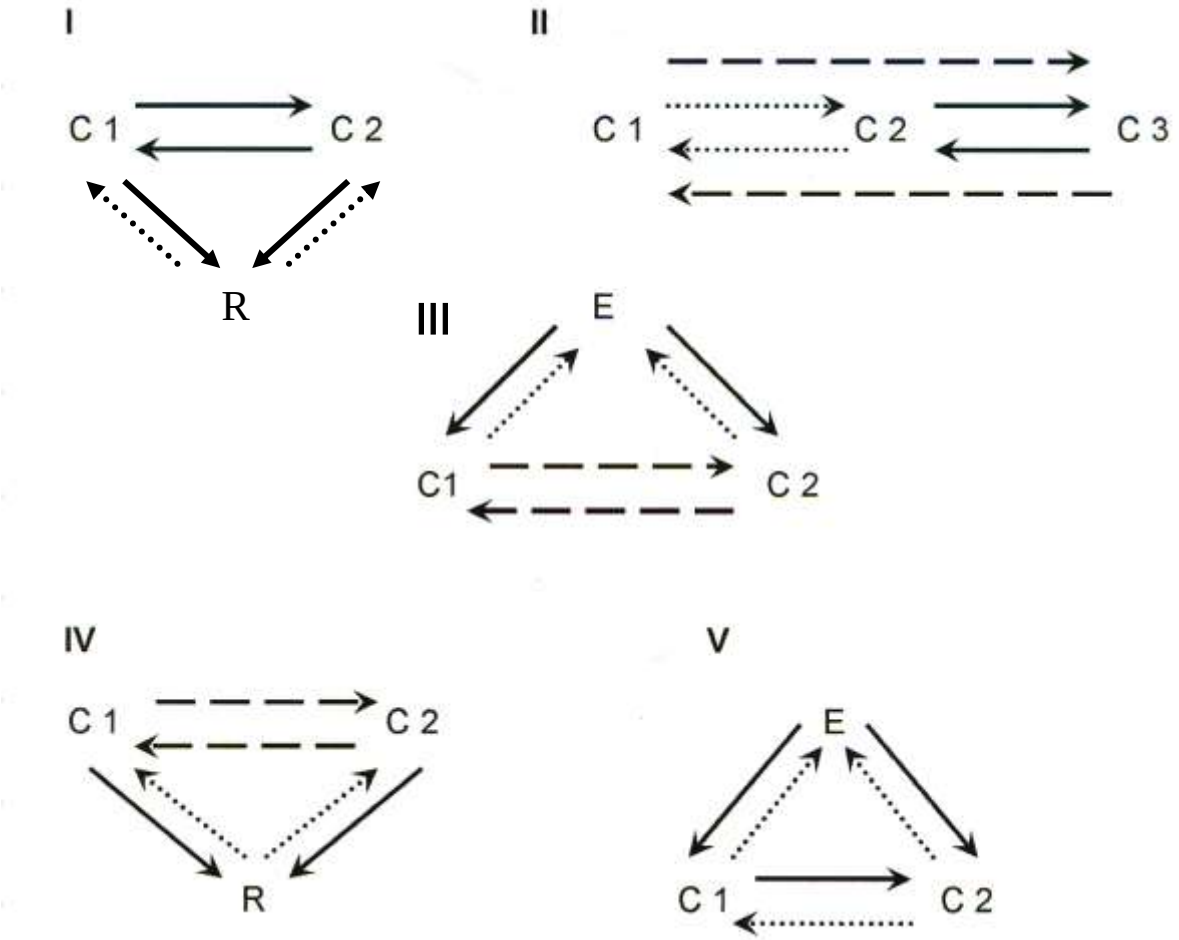
C: consumers. 消費者

E: natural enemies. 天敵

: direct interaction and negative influence. 直接的交互作用及負面影響

: indirect interaction and negative influence. 間接的交互作用及負面影響

: direct interaction and positive influence. 直接的交互作用及正面影響



The following two questions are related to the above figure. 根據上圖回答以下二題.

65- Identify two situations that could describe competition. 請選出兩種可以描述競爭的狀況

A) I and II

B) I and V

C) III and II

D) I and IV

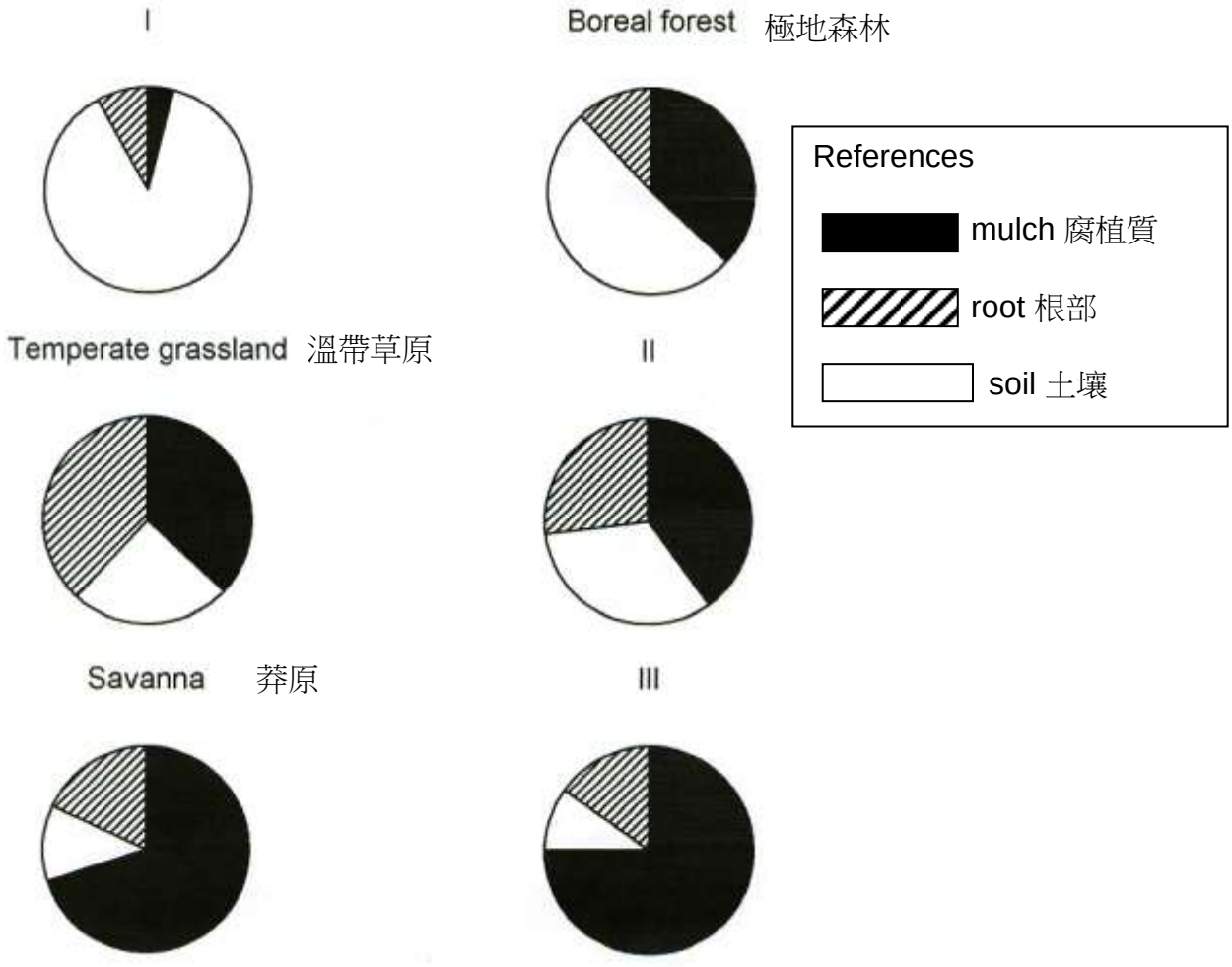
E) I and III

66- Identify the organisms with mutualistic interaction between them, and the example representing this situation: 請選出在下列何種狀況下, 個體間的交互作用為互利共生. .

	Mutualistic interaction between 互利共生	Example 舉例
A)	C1 C2	I
B)	C1 C2	II
C)	C2 C3	II
D)	E	III
E)	C1 C2	V

67- Organic matter decomposition depends in part on climatic factors such as temperature and precipitation. In the following schemes, the distribution of nitrogen in mulch (decayed organic material), root, and soil for six different biomes is shown. Which biome is represented in each of the following figures: I, II, and III?

有機質的分解會受氣候影響，若下圖表示在六個生域中，氮於腐植質(枯枝落葉及枯草等)、根部或土壤所產生比例，則圖中的 I、II、III 分別表示下列何種生域?



A) I= Tundra, II= Temperate deciduous forest, III= Tropical deciduous forest.
凍原 溫帶落葉林 熱帶落葉林

B) I= Tropical deciduous forest, II= Tundra, III= Temperate deciduous forest.

C) I= Temperate deciduous forest, II= Tropical deciduous forest, III= Tundra.

D) I= Tundra, II= Temperate deciduous forest, III= Tropical evergreen forest.
熱帶常綠森林

68- Which of the following statements are correct? 下列敘述何者正確?

Statements 敘述

I. The amount of nitrogen in living organisms is very small compared to the total quantity in the atmosphere. 生物體內的含氮量遠小於大氣中的含氮量

II. Less than 30% of the nitrogen available for plants comes from nitrogen-fixing bacteria or algae. 植物所用的氮氣中, 小於 30%來自固氮細菌或藻類

III. The gaseous nitrogen cycle is global because it implies an exchange between the ecosystem and the atmosphere.氮氣可於生態系及大氣交換, 故氮氣的循環為全球性的

IV. The input mechanisms of nutrients to an ecosystem are the same as the output ones. 營養鹽於生態系中輸入與輸出的機制相同

V. The nutrients cycles can be studied introducing radioactive markers in natural or artificial ecosystems. 可藉放射性元素追蹤營養鹽在自然或人為生態系中的循環

Answer

A) I; II; and IV.

B) II; III; and V.

C) I; III; and V.

D) III; IV; and V.

E) II; IV; and V.

69- In population ecology, dispersion refers to.

在族群生態學中, 散布 (Dispersion) 是指下列何者?

A) the movements of organisms between populations. 個體於族群間移動

B) the movements of organisms within a population. 個體於族群內移動

C) the spatial distribution of the organisms to one another. 個體間的空間分布

D) A and B are true.

E) B and C are true.

70 - Which of the following statements are true? 以下敘述何者正確?

Statements 敘述

I. The life table of a population does not change with the environmental conditions.

族群的生命表不受環境變化而影響

II. To project the population growth when birth and mortality rates vary according to individual age, we must know the proportion of individuals in each age-class.

當出生率與死亡率受個體年齡影響時, 若要預測族群成長, 須知道不同年齡層個體的比例

III. The life table of a population always varies according to the density of the population

族群的生命表必會受到族群密度的影響而改變

IV. The age-class structure of a population is affected by the temporal heterogeneity in individuals' recruitment.

族群年齡層結構受到族群中個體組成隨時間更替而影響

Answer

A) I, and III.

B) I, and IV.

C) II, and III.

D) II, and IV.

E) III, and IV.

BIOSYSTEMATICS 生物系統分類學

71- Development in marine molluscs may be characterized by:

海洋軟體的發育可能具有下列何項特徵?

A) trochophore larva. 有擔輪幼蟲

B) veliger larva 有緣膜(面盤)幼蟲

C) direct development without larval state. 不經過幼蟲期, 直接發育

D) all of them are correct. 以上皆正確

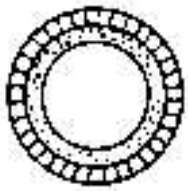
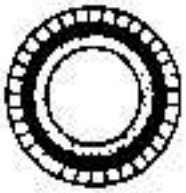
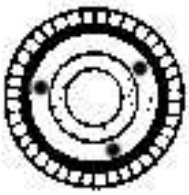
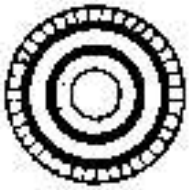
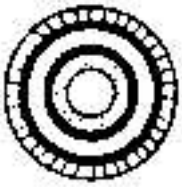
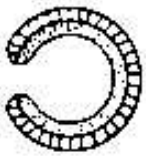
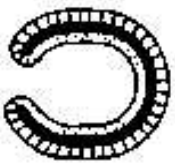
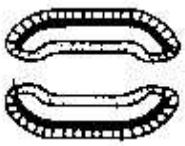
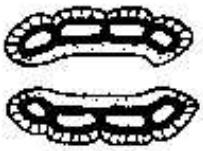
E) all of them are incorrect. 以上皆非

72- Observe the following diagrams of invertebrates embryos illustrating the characteristics of the body plan (bauplan). 觀察以下無脊椎動物的胚胎構造特徵圖

References

內胚層 中胚層 外胚層

Endoderm Mesoderm Ectoderm

Cross	I	II	III	IV	V
Transversal 橫切面					
Longitudinal 縱切面					

	Diploblastic **二胚層**	**Triploblastic** **三胚層**	
	No coeloms 無體腔	Pseudocoeloms 假體腔	true coeloms 真體腔
	Incomplete or blind gut 消化腔(腔狀消化道)	Complete gut (Tube-within-a-tube) 消化管(管狀消化道)	
	Without segmentation 無體節		With segmentation (metameric) 有體節

Select the correct sequence which corresponds to the Phyla represented with I, II, III, IV and V. 上表中的 I、II、III、IV、V 分別代表下列何種動物門, 請依正確順序排列.

A)	Cnidaria 腔腸動物門	Plathyhelminta 扁形動物門	Annelida 環節動物門	Nematoda 線形動物門	Arthropoda 節肢動物門
B)	Cnidaria 腔腸動物門	Plathyhelminta 扁形動物門	Nematoda 線形動物門	Arthropoda 節肢動物門	Annelida 環節動物門
C)	Nematoda 線形動物門	Arthropoda 節肢動物門	Plathyhelminta 扁形動物門	Cnidaria 腔腸動物門	Annelida 環節動物門
D)	Annelida 環節動物門	Cnidaria 腔腸動物門	Arthropoda 節肢動物門	Plathyhelminta 扁形動物門	Nematoda 線形動物門

73- The following characteristics correspond to: Unicellular organisms, eukaryotic cell with micronuclei and macronuclei, asexual reproduction by transverse binary fision and sexual reproduction by conjugation. Most are free-living. These are characteristics that correspond to 以下敘述為下列何種生物的特徵?

單細胞生物、具有大小核的真核生物、行無性分裂生殖、行有性結合生殖、多為自由生活

A) Rhizopoda 變形蟲綱

B) Apicomplexa 孢子蟲綱

C) Zoomastigophora 鞭毛蟲綱

D) Ciliophora 纖毛蟲綱

74- The main characteristics of the Asteraceae family are: 菊科的主要特徵為何?

A) calyx in the form of a pappus, sympetalous corolla. 花萼呈冠毛狀, 花瓣癒合

B) inferior ovary. 子房下位

C) seed separated from the pericarp. 種子與果皮分離

D) free filaments, fused anthers. 雄蕊花絲分離, 花藥癒合(聚藥雄蕊)

E) all of them are true. 以上皆是

75- The Orchidaceae family present: 蘭科的主要特徵為何?

A) superior ovary, three-carpellate, one loculed ovary.

子房上位, 三個心皮癒合成單一心室的子房

B) showy labellum. Pollen grains united in a mass. 唇瓣鮮豔, 花粉聚成一團塊

C) plants with terrestrial habitat only. 只生長於陸地環境

D) androecium with two whorls of stamens of six stamens each. 雄蕊兩輪, 每輪六枚雄蕊

E) fruit siliqua, The embryo is surrounded by storage tissue. 果實為角果, 營養組織圍繞胚

76 - The flower parts in the Solanaceae are: 茄科花的構造特徵為何？

A) calyx of 4 sepals, corolla of 4 petals, androecium usually with 6 stamens, parietal placentation. 花萼有四片萼片, 花冠有四片花瓣, 雄蕊通常 6 枚, 側膜胎座

B) calyx of 5 sepals, corolla of 5 petals, androecium usually with 5 stamens, axile placentation. 花萼有五片萼片, 花冠有五片花瓣, 雄蕊通常 5 枚, 中軸胎座

C) calyx of 5 sepals, corolla of 5 petals, androecium usually with 10 stamens, marginal placentation. 花萼有五片萼片, 花冠有五片花瓣, 雄蕊通常 10 枚, 邊緣胎座

D) calyx of 5 sepals, corolla of 5 petals, androecium usually with 4 stamens, axile placentation. 花萼有五片萼片, 花冠有五片花瓣, 雄蕊通常 4 枚, 中軸胎座

E) perigon of 6 tepals, androecium with 6 stamens, axile placentation.
花被片有六片, 雄蕊 6 枚, 中軸胎座

77- The Pinophyta are characterized by: 松柏植物門的特徵為何？

A) seedlings with two cotyledons. 幼苗具兩片子葉

B) anatropous ovule. 胚珠側面著生

C) double fertilisation. 具雙重受精

D) prothallus as storage tissue of the seed. 種子的營養組織是原葉體

E) high predominance of herbaceous species. 大部分是草本種類

78- The Liliopsida are characterized by:　單子葉植物的特徵為何？

A) a tap root system.　軸根系

B) typical netlike veins　典型的網狀脈

C) flower parts are usually in multiples of three.　花的組成為三的倍數

D) ring-like arrangement of vascular bundles.　維管束呈環狀

E) secondary growth.　具次級生長

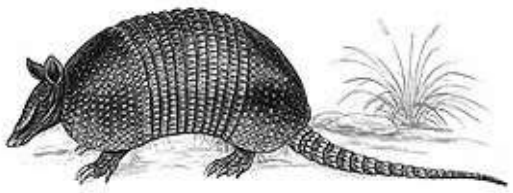
ETHOLOGY 行為學

** **The following 2 questions are related to the mulita** (*Dasypus hybridus*) **behavior.**

以下兩題與犰狳的行為有關：

To shelter and to look after its babies, the mulita (*Dasypus hybridus*) excavates cylindrical burrows where it builds its nest with vegetal matter, specially dry grasses (herbs).

犰狳會以植物(特別是乾草)為材料, 修築圓柱形的洞, 以遮蔽及照顧幼體.



79 - The mulitas avoid the overlapping of refuge and nestling areas by means of a fragrant sign: on moving into the burrow, they impregnate its roof with an oily and stinking liquid that is secreted by a gland placed in the back of the caparison at the pelvis level.

Therefore every adult mulita usually dwells into its own burrow -though sometimes the burrows may be occupied by several individuals. This behavior corresponds to:

為了避免其藏身及育幼處重疊, 犰狳會藉由氣味彼此區別. 當進入洞中時, 牠會藉由骨盆附近的腺體分泌一種油性, 具有臭味的液體, 噴灑於洞穴的頂端. 因此, 一般而言, 每隻成體多具有自己的洞穴, 然而, 偶而也可能有數個體同住在一起. 請問以上敘述屬於下列何者行為?

A) an altruistic behavior. 一種利他行為

B) a selfish or malicious behavior. 一種自私或惡意的行為

C) a territorial behavior. 一種領域行為

D) an agonistic behavior. 一種對抗衝突的行為

E) none of the previous ones. 以上皆非

80- The above mentioned behavior is adaptative and tends:

進行上述的行為是為了適應下列何種情形

A) to reduce the intraspecific competition. 減少種內競爭

B) to ensure the efficient use of the resources in a habitat.確保能夠有效使用棲地內資源

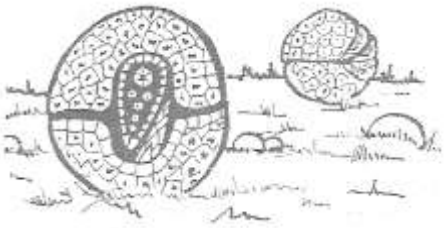
C) to control the population growth. 控制族群的成長

D) to stimulate the dispersion of the individuals. 刺激個體的擴散分布

E) all the previous ones are correct. 以上皆是

**** The armadillo commonly known as mataco or ball quirquincho (*Tolypeutes mataco*) adopts, sometimes, a typical position similar to a "ball" as you can see in the following figure; hence its name. In these cases, they draw in their feet and nose causing the exoskeleton plates of the body and head to fit tightly to each other.**

犰狳常被稱為球獸, 是因其常會表現出球狀的姿勢(如下圖), 在這種捲曲的過程中, 牠會將腳和鼻子縮起, 使其體表的骨板及頭緊靠在一起.



81- The armadillo exhibits this behavior when it faces a:

當它遇到下列何種狀況時, 會表現出此種行為?

A) sure hiding place. 可躲藏的空間

B) food source. 食物資源

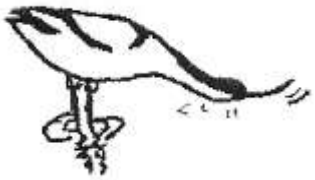
C) possible predator. 可能的掠食者

D) companion or a baby. 同伴或幼體

E) fragrant mark of a companion. 同伴遺留的氣味

82- Mating of *Recurvirostra avosetta*, a wading bird, is preceded by some peculiar movements. Both male and female clean their feathers nervously. After some time, the female takes a horizontal position (see picture) and this triggers the male to copulate. The horizontal position of the female corresponds to:

反嘴鴴(一種水鳥)在交配交配前表現出一些奇怪的動作，雌雄個體都會神經質地清理羽毛,一段時間後，雌鳥會表現出如圖所示的水平姿勢，這種姿勢可促使雄性個體與之交配，請問此種姿勢具有下列何種意義?



A) a conditioned reflex. 一種條件反射

B) a displacement activity. 一種取代行為

C) an innate response. 一種本能反應

D) a sign stimulus. 一種訊號刺激

E) the super normal releaser. 一種超越正常程度的表現